WHAT IS CLAIMED IS

1. An optical recording/reproducing method comprising the steps of:

performing a test writing in which writing a pattern of marks and spaces to an optical storage medium with a recording power p is repeated by sequentially changing the recording power p with increments of a predetermined power;

performing a test reading in which reading the pattern from the storage medium is repeated, so that data signals are reproduced from the respective patterns on the storage medium;

calculating a modulation parameter m for each of the reproduced data signals, each modulation parameter corresponding to one of the respective recording powers; and

determining an optimum recording power based on a relationship between the modulation parameters and the respective recording powers, wherein the determining step comprises the steps of:

selecting, from all of the modulation parameters and the recording powers, a sequence of pairs of the modulation parameter m and the recording power p;

calculating a gamma = $(\Delta m/m)/(\Delta p/p)$ for each of the

selected pairs of the modulation parameter m and the recording power p, the gamma defining a ratio of a change of the modulation parameter m, normalized by a modulation parameter value, to a change of the recording power p, normalized by a recording power value; and

finding a target recording power corresponding to the optimum recording power based on a function derived from a relationship between the calculated gammas and the respective recording powers, the target recording power causing a value of the function to be equal to zero,

wherein, in the selecting step, a pair of the modulation parameter m and the recording power p is omitted if a value of the modulation parameter of the pair is not larger than a first threshold value th1, and a pair of the modulation parameter m and the recording power p is selected if a value of the modulation parameter of a following pair first exceeds the first threshold value th1.

2. The optical recording/reproducing method of claim 1 wherein, in the selecting step, a pair of the modulation parameter m and the recording power p is selected if a value of the modulation parameter of a following pair first exceeds the first threshold value th1 and is larger than a second threshold value th2 (th2 > th1).

3. An optical recording/reproducing method comprising the steps of:

performing a test writing in which writing a pattern of marks and spaces to an optical storage medium with a recording power p is repeated by sequentially changing the recording power p with increments of a predetermined power;

performing a test reading in which reading the pattern from the storage medium is repeated, so that data signals are reproduced from the respective patterns on the storage medium;

calculating a modulation parameter m for each of the reproduced data signals, each modulation parameter corresponding to one of the respective recording powers; and

determining an optimum recording power based on a relationship between the modulation parameters and the respective recording powers, wherein the determining step comprises the steps of:

selecting, from all of the modulation parameters and the recording powers, a sequence of pairs of the modulation parameter m and the recording power p;

approximating the modulation parameter into a continuous function m(p) of the recording power p based on the selected pairs of the modulation parameter m and the recording power p; and

finding a target recording power corresponding to the optimum recording power, based on a derivative function (dm/dp) of the function m(p) with respect to the recording power p, the target

recording power causing a value of (dm/dp) * (p/m) to be equal to a predetermined value,

wherein, in the selecting step, a pair of the modulation parameter m and the recording power p is omitted if a value of the modulation parameter of the pair is not larger than a first threshold value th1, and a pair of the modulation parameter m and the recording power p is selected if a value of the modulation parameter of a following pair first exceeds the first threshold value th1.

4. The optical recording/reproducing method of claim 3 wherein, in the selecting step, a pair of the modulation parameter m and the recording power p is selected if a value of the modulation parameter of a following pair first exceeds the first threshold value th1 and is larger than a second threshold value th2 (th2 > th1).

5. An optical recording/reproducing method comprising the steps of:

performing an initial test writing in which writing a pattern of marks and spaces to an optical storage medium with a recording

power p is repeated by sequentially changing the recording power p with first increments of a predetermined power;

performing an initial test reading in which reading the pattern from the storage medium is repeated, so that data signals are reproduced from the respective patterns on the storage medium;

calculating a first modulation parameter m for each of the reproduced data signals, each first modulation parameter corresponding to one of the respective recording powers;

setting a first recording power pth by finding a pair of the first modulation parameter m and the recording power p, from among all pairs of the first modulation parameters and the respective recording powers, a value of the first modulation parameter of the pair first exceeding a first threshold value th;

performing a secondary test writing in which writing the pattern of marks and spaces to the storage medium with the recording power p, substantially centered on the first recording power pth, is repeated by sequentially changing the recording power p with second smaller increments of a predetermined power;

performing a secondary test reading in which reading the pattern from the storage medium is repeated, so that data signals are reproduced from the respective patterns on the storage medium;

calculating a second modulation parameter m for each of the reproduced data signals, each second modulation parameter corresponding to one of the respective recording powers;

selecting, from all of the second modulation parameters and

the recording powers, a sequence of pairs of the second modulation parameter m and the recording power p;

calculating a gamma = $(\Delta m/m)/(\Delta p/p)$ for each of the selected pairs of the second modulation parameter m and the recording power p, the gamma defining a ratio of a change of the second modulation parameter m, normalized by a modulation parameter value, to a change of the recording power p, normalized by a recording power value; and

finding a target recording power corresponding to an optimum recording power based on a function derived from a relationship between the calculated gammas and the respective recording powers, the target recording power causing a value of the function to be equal to zero.

6. The optical recording/reproducing method of claim 5, wherein, in the selecting step, a pair of the second modulation parameter m and the recording power p is omitted if a value of the second modulation parameter of the pair is not larger than a third threshold value th3, and a pair of the second modulation parameter m and the recording power p is selected if a value of the second modulation parameter of a following pair first exceeds the third threshold value th3.

7. The optical recording/reproducing method of claim 6, wherein, in the selecting step, a pair of the second modulation parameter m and the recording power p is selected if a value of the second modulation parameter of a following pair first exceeds the third threshold value th3 and is larger than a fourth threshold value th4 (th4 > th3).

8. An optical recording/reproducing method comprising the steps of:

performing an initial test writing in which writing a pattern of marks and spaces to an optical storage medium with a recording power p is repeated by sequentially changing the recording power p with first increments of a predetermined power;

performing an initial test reading in which reading the pattern from the storage medium is repeated, so that data signals are reproduced from the respective patterns on the storage medium;

calculating a first modulation parameter m for each of the reproduced data signals, each first modulation parameter corresponding to one of the respective recording powers;

setting a first recording power pth by finding a pair of the first modulation parameter m and the recording power p, from among all pairs of the first modulation parameters and the respective recording

powers, a value of the first modulation parameter of the pair first exceeding a first threshold value th;

performing a secondary test writing in which writing the pattern of marks and spaces to the storage medium with the recording power p, substantially centered on the first recording power pth, is repeated by sequentially changing the recording power p with second smaller increments of a predetermined power;

performing a secondary test reading in which reading the pattern from the storage medium is repeated, so that data signals are reproduced from the respective patterns on the storage medium;

calculating a second modulation parameter m for each of the reproduced data signals, each second modulation parameter corresponding to one of the respective recording powers;

selecting, from all of the second modulation parameters and the recording powers, a sequence of pairs of the second modulation parameter m and the recording power p;

approximating the second modulation parameter into a continuous function m(p) of the recording power p based on the selected pairs of the second modulation parameter m and the recording power p; and

finding a target recording power corresponding to an optimum recording power, based on a derivative function (dm/dp) of the function m(p) with respect to the recording power p, the target recording power causing a value of (dm/dp) * (p/m) to be equal to a predetermined value.

9. The optical recording/reproducing method of claim 8, wherein, in the selecting step, a pair of the second modulation parameter m and the recording power p is omitted if a value of the second modulation parameter of the pair is not larger than a third threshold value th3, and a pair of the second modulation parameter m and the recording power p is selected if a value of the second modulation parameter of a following pair first exceeds the third threshold value th3.

10. The optical recording/reproducing method of claim 9, wherein, in the selecting step, a pair of the second modulation parameter m and the recording power p is selected if a value of the second modulation parameter of a following pair first exceeds the third threshold value th3 and is larger than a fourth threshold value th4 (th4 > th3).

11. The optical recording/reproducing method of claim 1, wherein the gamma is approximated into a continuous function of the recording power p, and the target recording power is determined based on the continuous function of the recording power p.

12. An optical recording/reproducing apparatus comprising:

a test writing unit performing a test writing in which writing a pattern of marks and spaces to an optical storage medium with a recording power p is repeated by sequentially changing the recording power p with increments of a predetermined power;

a test reading unit performing a test reading in which reading the pattern from the storage medium is repeated, so that data signals are reproduced from the respective patterns on the storage medium;

a calculation unit calculating a modulation parameter m for each of the reproduced data signals, each modulation parameter corresponding to one of the respective recording powers; and

a determination unit determining an optimum recording power based on a relationship between the modulation parameters and the respective recording powers, wherein the determination unit comprises:

a selection unit selecting, from all of the modulation parameters and the recording powers, a sequence of pairs of the modulation parameter m and the recording power p;

a gamma calculation unit calculating a gamma = $(\Delta m/m)/(\Delta p/p)$ for each of the selected pairs of the modulation parameter m and the recording power p, the gamma defining a ratio of a change of the modulation parameter m, normalized by a modulation parameter value, to a change of the recording power p, normalized by a recording power value; and

a target recording power unit finding a target recording power

corresponding to the optimum recording power based on a function derived from a relationship between the calculated gammas and the respective recording powers, the target recording power causing a value of the function to be equal to zero,

wherein the selection unit omits a pair of the modulation parameter m and the recording power p if a value of the modulation parameter of the pair is not larger than a first threshold value th1, and selects a pair of the modulation parameter m and the recording power p if a value of the modulation parameter of a following pair first exceeds the first threshold value th1.

13. The optical recording/reproducing apparatus of claim 12 wherein the selection unit selects a pair of the modulation parameter m and the recording power p if a value of the modulation parameter of a following pair first exceeds the first threshold value th1 and is larger than a second threshold value th2 (th2 > th1).

14. An optical recording/reproducing apparatus comprising:

a test writing unit performing a test writing in which writing a

pattern of marks and spaces to an optical storage medium with a recording power p is repeated by sequentially changing the recording power p with increments of a predetermined power;

a test reading unit performing a test reading in which reading the pattern from the storage medium is repeated, so that data signals are reproduced from the respective patterns on the storage medium;

a calculation unit calculating a modulation parameter m for each of the reproduced data signals, each modulation parameter corresponding to one of the respective recording powers; and

a determination unit determining an optimum recording power based on a relationship between the modulation parameters and the respective recording powers, wherein the determination unit comprises:

a selection unit selecting, from all of the modulation parameters and the recording powers, a sequence of pairs of the modulation parameter m and the recording power p;

an approximation unit approximating the modulation parameter into a continuous function m(p) of the recording power p based on the selected pairs of the modulation parameter m and the recording power p; and

a target recording power unit finding a target recording power corresponding to the optimum recording power, based on a derivative function (dm/dp) of the function m(p) with respect to the recording power p, the target recording power causing a value of (dm/dp) * (p/m) to be equal to a predetermined value,

wherein the selection unit omits a pair of the modulation parameter m and the recording power p if a value of the modulation parameter of the pair is not larger than a first threshold value th1, and selects a pair of the modulation parameter m and the recording power p if a value of the modulation parameter of a following pair first exceeds the first threshold value th1.

15. The optical recording/reproducing apparatus of claim 14, wherein the selection unit selects a pair of the modulation parameter m and the recording power p if a value of the modulation parameter of a following pair first exceeds the first threshold value th1 and is larger than a second threshold value th2 (th2 > th1).

16. An optical recording/reproducing apparatus comprising:

a first test writing unit performing an initial test writing in which writing a pattern of marks and spaces to an optical storage medium with a recording power p is repeated by sequentially changing the recording power p with first increments of a predetermined power;

modulation parameter corresponding to one of the respective recording powers;

a selection unit selecting, from all of the second modulation parameters and the recording powers, a sequence of pairs of the second modulation parameter m and the recording power p;

a gamma calculation unit calculating a gamma = $(\Delta m/m)/(\Delta p/p)$ for each of the selected pairs of the second modulation parameter m and the recording power p, the gamma defining a ratio of a change of the second modulation parameter m, normalized by a modulation parameter value, to a change of the recording power p, normalized by a recording power value; and

a target recording power unit finding a target recording power corresponding to an optimum recording power based on a function derived from a relationship between the calculated gammas and the respective recording powers, the target recording power causing a value of the function to be equal to zero.

17. The optical recording/reproducing apparatus of claim 16, wherein the selection unit omits a pair of the second modulation parameter m and the recording power p if a value of the second modulation parameter of the pair is not larger than a third threshold value th3, and selects a pair of the second modulation parameter m

and the recording power p if a value of the second modulation parameter of a following pair first exceeds the third threshold value th3.

18. The optical recording/reproducing apparatus of claim 17, wherein the selection unit selects a pair of the second modulation parameter m and the recording power p if a value of the second modulation parameter of a following pair first exceeds the third threshold value th3 and is larger than a fourth threshold value th4 (th4 > th3).

19. An optical recording/reproducing apparatus comprising:

a first test writing unit performing an initial test writing in which writing a pattern of marks and spaces to an optical storage medium with a recording power p is repeated by sequentially changing the recording power p with first increments of a predetermined power;

a first test reading unit performing an initial test reading in which reading the pattern from the storage medium is repeated, so

that data signals are reproduced from the respective patterns on the storage medium;

a first calculation unit calculating a first modulation parameter m for each of the reproduced data signals, each first modulation parameter corresponding to one of the respective recording powers;

a recording power unit setting a first recording power pth by finding a pair of the first modulation parameter m and the recording power p, from among all pairs of the first modulation parameters and the respective recording powers, a value of the first modulation parameter of the pair first exceeding a first threshold value th;

a second test writing unit performing a secondary test writing in which writing the pattern of marks and spaces to the storage medium with the recording power p, substantially centered on the first recording power pth, is repeated by sequentially changing the recording power p with second smaller increments of a predetermined power;

a second test reading unit performing a secondary test reading in which reading the pattern from the storage medium is repeated, so that data signals are reproduced from the respective patterns on the storage medium;

a second calculation unit calculating a second modulation parameter m for each of the reproduced data signals, each second modulation parameter corresponding to one of the respective recording powers;

a selection unit selecting, from all of the second modulation parameters and the recording powers, a sequence of pairs of the second modulation parameter m and the recording power p;

a function approximation unit approximating the second modulation parameter into a continuous function m(p) of the recording power p based on the selected pairs of the second modulation parameter m and the recording power p; and

a target recording power unit finding a target recording power corresponding to an optimum recording power, based on a derivative function (dm/dp) of the function m(p) with respect to the recording power p, the target recording power causing a value of (dm/dp) * (p/m) to be equal to a predetermined value.

20. The optical recording/reproducing apparatus of claim 19, wherein the selection unit omits a pair of the second modulation parameter m and the recording power p if a value of the second modulation parameter of the pair is not larger than a third threshold value th3, and selects a pair of the second modulation parameter m and the recording power p if a value of the second modulation parameter of a following pair first exceeds the third threshold value th3.

21. The optical recording/reproducing apparatus of claim 20, wherein the selection unit selects a pair of the second modulation parameter m and the recording power p if a value of the second modulation parameter of a following pair first exceeds the third threshold value th3 and is larger than a fourth threshold value th4 (th4 > th3).

22. The optical recording/reproducing apparatus of claim 12, wherein the gamma is approximated into a continuous function of the recording power p, and the target recording power is determined based on the continuous function of the recording power p.